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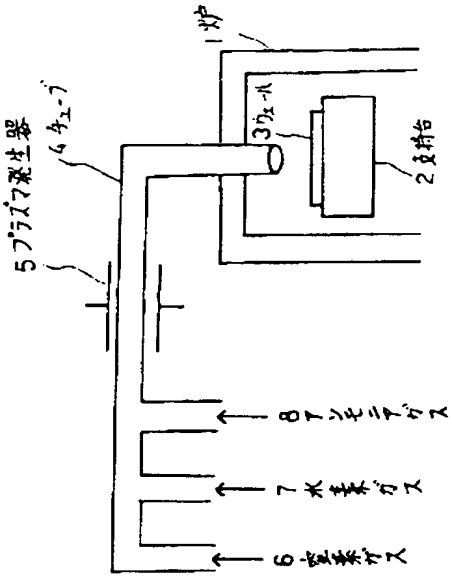
TITLE : FORMING METHOD OF SILICON NITRIDE FILM



ABSTRACT : PURPOSE: To make it possible to form an Si_3N_4 film while heating an Si substrate or an Si film (including an SiO_2 film) at a temperature of 80°C or below, by providing a plasma generator and by applying a nitrogen radical onto the surface of the Si substrate or the Si film (including the SiO_2 film).

CONSTITUTION: A nitrogen gas 6 sent by a tube 4 is excited by a plasma generator 5 while a wafer 3 whereon an Si substrate or an Si film and an SiO_2 film are formed is heated to about 600°C by a furnace 1, and thereby a nitrogen plasma is generated. When an active nitrogen radical in the nitrogen plasma is applied onto the surface of the wafer 3, subsequently, the surface of the Si substrate or the Si film or the SiO_2 film can be turned into an Si_3N_4 film at a speed of about 100Å/min. As for an introduced gas, an ammonia gas may be substituted for the nitrogen gas, and the mixture of the nitrogen gas and a hydrogen gas may be used as well. In this case, a hydrogen radical is also produced simultaneously with the nitrogen radical and a still lower temperature and film formation at a still higher speed can be attained. According to this constitution, generation of a strain in a heating treatment, which accompanies enlargement of the diameter of an Si wafer and others, can be held down.